

## 44. OVIPOSITION BEHAVIOUR AND EGG HATCHABILITY IN TASAR UJI FLY

*BLEPHARIPA ZEBINA* (WALKER)

(With a text-figure)

## INTRODUCTION

The tasar uji fly *Blepharipa zebina* (Walker) (Diptera: Tachinidae) has been a major parasitoid of tasar silkworm *Antheraea paphia* (Linn.) (= *A. mylitta* Drury) in the traditional and oak tasar belts of North India, causing nearly 10% loss to the tasar crop (Jolly *et al.* 1974). The parasitoid occurs in Khanapur and Biligiri Rangan Hills of Karnatak where tasar silkworm is reared on commercial scale. A perusal of literature revealed that information on oviposition behaviour and egg hatchability of the parasitoid is very scanty, and this paper deals with the above aspects.

## MATERIAL AND METHODS

The observations on oviposition behaviour were made at the Basic Tasar Seed Farm, Khanapur (Belgaum District) during December, 1986. The *A. paphia* worms utilized for the study were from the commercial outdoor rearings on *Terminalia* trees. They were mostly at their III or IV instars. The uji infested worms were brought and held in the laboratory for studies on oviposition and egg hatchability of the parasitoid.

## OBSERVATIONS AND DISCUSSION

**Host-stage-preference:** The uji fly exercised care and preference in selecting the proper host for oviposition. Fourth instar worms were most preferred as compared with those at III instar. In the present survey, the number of eggs laid by the parasitoid on IV instar host was ten times the number laid on III instar host. For instance, on



Fig. 1. Tasar silkworm *Antheraea paphia* parasitized by uji fly *Blepharipa zebina*: a. Tasar uji fly eggs; b. Black scar, diagnostic of tasar infestation.

an average 41.33 eggs (ranging from 22 to 77 per larva) were laid on IV instar, whereas only 4.0 eggs (ranging from 1 to 8 eggs per larva) were laid on III instar tasar worm. Even during the III moult, i.e. at the time when the host was entering into its IV instar, the number of eggs laid by the parasitoid was very less (average 1.67). Moreover, the worms at II and I instars were among the least preferred ones. Interestingly, no eggs were laid on the fully grown prespinning or spinning worms. Likewise, the worms settling for moult were also avoided. Besides, less number of eggs (on an average 2.0 per larva) were laid on pebrinised worms. Furthermore, it was noticed that, even among the worms of preferred instars, the fly selected well-fed worms as against the poorly developed ones. Singh (1986) remarked that generally the parasitoid preferred bigger worms. However, the present study shows that the preferences were made on the basis of the host-stage, health and vigour.

**Host-site-preference:** The parasitoid laid the majority of eggs on the dorsal surface of the host. For example, about 75.4% of the eggs were laid on dorsal aspect, while only 24.1 and 0.5% on the lateral and ventral surfaces respectively. Reasons for such a preferential deposition of the eggs appear to be the responses of the host to the uji fly at the time of oviposition. It was observed that the fly which alighted on the lateral aspect was driven away by the sideward movements of the body, and the eggs laid on sides were dislodged by nibbling by the host. Moreover the parasitoid could hardly get any space to oviposit on the ventral surface since it was tightly attached to the substratum. However, the fly which alighted on dorsal surface remained undisturbed.

**Act of oviposition:** The adult uji flies were very active during cooler hours of the day with moderate sunshine, i.e. from 0900 to 1200 hrs and 1600 to 1700 hrs. During this period they flew actively around the tasar silkworms.

Initially, tasar silkworms did not allow the gravid female uji fly to alight on their body for oviposition. They briskly moved their anterior portion of the body sideways so that the fly got physically disturbed. However, the female fly made persistent and hectic attempts to settle on the body of the host. Too frequent visits by the fly ultimately exhausted the worms and at this stage the fly alighted on the host's body and walked freely over its body.

Settling on the host, the fly first feels the surface of the worm with the help of its protruded ovipositor. Sitting parallel to the body segments of the host, she fastened the

eggs one after another transversely to the long axis of the body, avoiding the intersegmental regions and the tubercles. The eggs were laid singly but in instalments. In majority of the cases the eggs were glued side by side very near to each other (Fig. 1) with their micropylar end invariably pointing upwards. At each visit the fly laid one or more than one egg on the host. A maximum of 77 eggs were counted on the body of a healthy IV instar host. Perhaps, therefore, the superparasitism was very common in the tasar population.

**Hatching of eggs:** The eggs usually hatched in 3 days after deposition, i.e., in the present case they hatched in the last week of December. The percent hatchability was as high as 97.9 (ranging from 66.7 to 100) under laboratory con-

ditions. A longitudinal slit was made on the attached surface of the egg extending up to 1/2 or 2/3 length from the micropylar end. And the tiny maggot penetrated directly into the host's integument through the slit. Soon the area around the point of entry of the maggot became black (Fig. 1). This black mark is the characteristic feature of uji fly infestation which can be utilized for diagnostic purpose. The egg shell remained attached to the integument of the host even after the death, decay and drying of the carcass of the silkworm.

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## 45. A CONTRIBUTION TO THE FLORA OF GANGANAGAR (RAJASTHAN)

### INTRODUCTION

Ganganagar is situated in the north of Rajasthan State between 28° 40' and 30° 06' N Lat. and 72° 36' and 75° 30' E Long. It constitutes a part of the Great Indian Desert. The Gang canal drawing water from the Sutlej river was launched in the year 1927-28, which has greatly changed the face of the area. The irrigation waters, which owe their source to the Punjab rivers, have been bringing seeds and other propagules of a number of extra-limital species year after year and many of these have already become successfully established in the area as crop weeds or along the banks of canals (Dhillon and Bajwa 1969, Dhillon and Bhandari 1974, Singh and Brar 1984). The most striking example of this naturalization of Himalayan plants in the Great Indian Desert are species of *Riccia*, *Marchantia* and *Ophioglossum vulgatum* L. (Singh and Brar 1980) which are found frequently in the canal irrigated areas, showing thereby the extent to which plants from the Himalayas and other places have become naturalised in the irrigated desert.

There are no rocks or gravelly soil in the district. In the irrigated tract, soil under irrigation by Gang canal and Bhakra canal are sandy-loam. In the non-command areas, sandy plains with stabilized and shifting sand dunes are a common sight in the South of the district and its adjoining districts Churu and Bikaner of Rajasthan. There is a seasonal river called Ghagger which enters the tehsil Tibbi in the East and through Anupgarh flows to Pakistan. The soil in the bed of this river is heavy clay. There are some

saline areas near Jetsar and Anupgarh where a few halophytes occur. The average annual rainfall is less than 300 mm. The rainy months are June to September with maximum rainfall in July-August. The summers are extremely hot and winters severely cold. The maximum and minimum average temperatures recorded are 44° C and 5° C, respectively.

We are presently working on the flora of North Rajasthan. While studying the specimens, we found some of these were not reported previously from Rajasthan desert (Blatt. and Hallb. 1918-21; Puri *et al.* 1964, Bor 1960, Bhandari 1978, Sharma and Tiagi 1979), therefore, new extrants to the desert. The specimens have been preserved in the Herbarium, Department of Botany, SGN Khalsa College, Sriganganagar, Rajasthan.

### RESULTS AND DISCUSSION

The vegetation of the area explored can be divided into:

- (1) vegetation of loose sand dunes and sandy regions,
- (2) vegetation of stabilized sand dunes
- (3) vegetation of Ghagger Alluvial plains,
- (4) weeds of winter season
- (5) weeds of rainy season,
- (6) vegetation along canals,